STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

DIVISION OF UNDERGROUND STORAGE TANKS

COMPLIANCE GUIDANCE DOCUMENT - 106

EFFECTIVE DATE - July 29, 1996
(REVISION DATE - July 19, 1999)

RE: REQUIREMENTS FOR VAPOR MONITORING

The purpose of this guidance document is to assist the regulated community in understanding the regulatory requirements for *Rule 1200-1-15-.04(3)(e)* Vapor monitoring. This rule states the following:

Vapor monitoring. Testing or monitoring for vapors within the soil gas of the excavation zone must meet the following requirements:

1. *The materials used as backfill are sufficiently porous (e.g. gravel, sand, crushed rock) to readily allow diffusion of vapors from releases into the excavation area;*

2. *The stored petroleum, or a tracer compound placed in the tank system, is sufficiently volatile (e.g. gasoline) to result in a vapor level that is detectable by the monitoring devices located in the excavation zone in the event of a release from the tank;*

3. *The measurement of vapors by the monitoring device is not rendered inoperative by the groundwater, rainfall, or soil moisture or other known interferences so that a release could go undetected for more than 30 days;*

4. *The level of background contamination in the excavation zone will not interfere with the method used to detect releases from the tank;*

5. *The vapor monitors are designed and operated to detect any significant increase in concentration above background of the petroleum stored in the tank system, a component or components of that substance, or a tracer compound placed in the tank system;*

6. *In the UST excavation zone, the site is assessed to ensure compliance with the requirements in parts (e)1. - 4. of Rule 1200-1-15-.04(3) and to establish the number and positioning of monitoring wells that will detect releases within the excavation zone from any portion of the tank that routinely contains petroleum; and*

7. *Monitoring wells are clearly marked and secured to avoid unauthorized access and tampering.*

INTRODUCTION

Vapor monitoring is a monthly method of external release detection that can be utilized as a sole method of release detection for tanks, as well as piping, if conditions are right.

Petroleum leaking from underground storage tank systems is commonly released in the liquid phase. Liquid product volatilizes and the resulting vapors migrate rapidly through the UST system backfill material. Vapor monitors utilize devices which measure these vapors in the permeable backfill of the UST system.

Vapor wells are typically constructed of 2 inch to 4 inch inner diameter (I.D.) polyvinyl chloride (PVC). Other materials which may be used are stainless steel, cast iron, galvanized steel, polyethylene, polypropylene fluorocarbon resins, or Teflon.

Vapor monitoring is not always an acceptable method of release detection because some hydrocarbons, e.g. diesel fuel, used oil, and gear oil have low levels of volatility. For these hydrocarbons, the monitoring device must be third party certified and properly calibrated to detect low levels of vapors, or a tracer compound must be added to the petroleum product.

REQUIREMENTS FOR VAPOR MONITORING

In the UST excavation zone, the site must be assessed by a qualified individual, for example a Professional Geologist or Professional Engineer. The assessment information shall contain a notarized statement with a perjury clause and shall ensure compliance with the following requirements:

1. Vapor monitoring wells must be installed in the tank pit excavation and/or line trenches.

2. Backfill used around the monitored UST system must be coarse sand, pea gravel, or washed sized stone, or must meet the requirements set forth in item 3 below.

3. If backfill is other than sand or gravel, then an assessment of the material must be conducted to determine the permeability of the material (usually permeability values greater than 1×10^{-3} centimeter per second are acceptable). A backfill permeability study must include the following:

    a. Permeability of the backfill material.
    b. A scaled drawing of the UST system.
    c. The depth from ground surface to tank bottom.
    d. Location and identification number of each monitoring point.
    e. Monitoring zone based on permeability.
    f. Documentation that observation points will detect a release within 30 days.

4. Location of Vapor Wells:

    a. Vapor wells must be installed in high permeability backfill within the UST excavation zone.

b. The assessment must determine the number and spacing of vapor wells based on the permeability and rate of diffusion.

d. Vapor wells may be used in piping runs and dispenser areas. These areas must have either sand, gravel, or graded washed stone backfill or an assessment demonstrating permeability and rate of diffusion.

5. Vapor Well Installation Procedures

   a. A screen with factory milled 0.01 inch slots must be installed to a depth of one (1) foot below the bottom of the tank excavation and/or piping trench. The screen must extend to two (2) feet below ground surface for tank excavations and one (1) foot below ground surface for piping trenches.

   b. Casing must be installed above the screen to ground surface. A bentonite seal must be placed above the screen in the space between the casing and the backfill material.

   c. Screen slots must permit inflow of vapors or liquid, but not backfill material.

   d. Vapor monitoring wells must be clearly marked and locked with a waterproof cap.

6. The monitoring device must be calibrated and maintained in accordance with the manufacturers instructions, including routine maintenance and service checks for operability or running condition.

REPORTING AND RECORDKEEPING

If monitoring results indicate the UST system may have had a release, then the owner and/or operator shall notify the Division within 72 hours and begin release investigation and confirmation steps in accordance with *Rule 1200-1-15-.05(3).* This applies unless: the monitoring device is found to be defective, and is immediately repaired, recalibrated, or replaced, and additional monitoring does not confirm the initial result. If the monitoring device is determined to be defective and a suspected release was not reported to the Division, the owner/operator shall document that the device was defective and the actions taken for correction. This documentation shall also include additional monitoring results.

Any of the following may constitute a suspected release:

   a. Any automatic or continuous monitoring device which signals an alarm.

   b. Observation of any liquid product during manual monitoring.

   c. If a significant change in hydrocarbon levels is detected during a monthly monitoring event, readings must be collected weekly for the next four consecutive weeks. If elevated readings continue, the owner and/or operator must notify the Division within 72 hours and follow Rule 1200-1-15-.05 (3) to perform a release investigation.

Monitoring results shall be kept for each month and must include, but not necessarily be limited to the following:

a. Date of reading.
b. Well number or some other means of identifying well.
c. Depth to groundwater from ground surface.
d. Monitoring results.
e. The vapor reading reported in parts per million.
f. Type of monitoring device and date last calibrated.
g. Name and initials of person taking the reading.
h. If a suspected release was detected describe what actions were taken.

* The attached form may be photocopied and used for documentation of ground water monitoring results.

Records of the release detection being performed must be maintained and be made available to the Division during an inspection. The last twelve months of release detection results are required. Results of any sampling, testing, or monitoring must be maintained for at least 1 year.

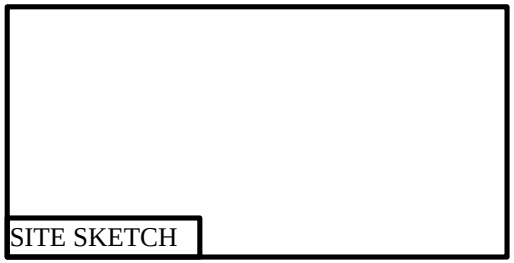
Records pertaining to the installation of the vapor monitoring system should be maintained. Records of all calibration, maintenance, and repairs of release detection equipment permanently located on-site must be maintained for at least one year after the servicing work is completed. Any schedules of required calibration and maintenance provided by the release detection equipment manufacturer must be retained for five (5) years from the date of installation. Note: Records of UST system repairs must be maintained for the life of the UST system.

As-built, scaled drawings of the vapor wells showing well construction through a cross-sectional diagram must be kept for the life of the system.

Records must be kept at the UST site and immediately available for inspection by the Division, or at a readily available alternative site and be provided for inspection to the Division upon request.

If the presence of water renders the vapor monitoring well inoperative for more than 30 days, then another method of release detection must be implemented immediately to comply with requirements of *Rule 1200-1-15-.04*. The Compliance Guidance Document related to the method chosen can be obtained from the Division.

Note: Vapor monitoring may be used on piping provided that it can detect a release from any portion of the underground piping that routinely contains petroleum. For additional information concerning release detection requirements on UST piping, please see Compliance Guidance Document (CGD)-110 for pressurized piping or CGD-111 for suction piping.



VAPOR MONITORING WELL RECORD

Depth from Ground Surface
To Tank Bottom (in feet) _____

Instrument Name & Type
Used for Vapor Readings _____

Facility Name _____

Facility ID # _____

Date Last Calibrated _____

Date	Vapor Reading (in PPM)						Water in Well (Yes/No)	Observer's Name	Observer's Initials
	Well # 1	Well # 2	Well # 3	Well # 4	Well # 5	Well # 6			